Big Data Analytics for Smart Cities
The H2020 CLASS Project
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Challenge – Beyond Big Data

• Leveraging big-data computation in field applications, such as smart cities, requires further advancements beyond cluster computation:
  1. Distributing computation across the entire heterogeneous compute continuum – from cloud to edge to devices
  2. Certain computations need to be executed with real-time guarantees in response to events
  3. An event-driven programming model that allows mixing components with different APIs (e.g., Map/Reduce, CEP, sequential code - COMPSs)

CLASS Software Architecture

Objective – development productivity and execution efficiency:
  1. Distribute big-data workloads with real-time requirements in the compute continuum using COMPSs from BSC
  2. Leverage novel embedded hardware in the edge, large capacity in the cloud
  3. Employ serverless polyglot platform (Apache OpenWhisk) for an event-driven heterogeneous programming model and analytics foundation (e.g., PyWren / Spark).

Smart City Use Case

Deployed in 1 Km² urban area of the city of Modena populated with IoT devices (e.g., smart cameras, traffic scanner) that exchange information

Three connected cars equipped with V2X connectivity, cameras @4K, long-range and middle range radars, and ultrasound sensors

Application Use Cases

• Intelligent traffic management, acting on traffic lights and smart road signals
  • “Green routes” for emergency vehicles
  • Traffic optimization based on dynamic traffic sign control

• Advanced driving assistance systems (ADAS)
  • Intelligent cross road management based on obstacle detection
  • Automated valet parking systems

• Knowledge extracted from sensor fusion from geographically disperse data-sources coming from city and vehicle sensors